338
ASSSESSMENT OF MYOCARDIAL AND RENAL BLOOD FLOW BY
POSITRON TOMOGRAPHY USING STRONTIUM-RUBIDIUM
GENERATOR
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Strontium-rubidium generator can elute rubidium-82 (Rb-82) (half life 75 sec) in every
10-20 minutes. Since this positron tracer Rb-82 distributes in the organ according to blood flow as
potassium analogue as thallium-201, repeated organ
perfusion study is feasible without in-house
cyclotron. Accordingly, serial myocardial and
renal perfusion images were obtained in canine
model with brain PET camera (PC-384).

We conclude that PET with Rb-82 is microsphere
mean renal flow generator. Heart and kidneys are
a promising model with brain PET camera (PC-384). N
Tamaki, NDM Alpert, HDW Strauss of Massachu8ett8
POSITRON TOMOGRAPHY USING STRONTIUM-RUBIDIUM
observed between Rb-82 uptake in the kidney as
well as mild decrease in activity after the release of LAD.

For myocardial imaging, PET scan was performed
from one minute following bolus injection of 50mCi
of Rb-82. At control, homogeneous tracer
distribution in left ventricular myocardium was
observed. After LAD ligation, perfusion defect was
observed at the apex, which was partially recovered
after the release of LAD.

For renal imaging, PET scan was performed
during constant infusion of Rb-82. At control high
cortices. Unilateral renal artery occlusion revealed no tracer activity in the occluded kidney as
were the mild decrease in activity in contralateral kidney. Non-linear correlation was
observed between Rb-82 uptake in the kidney and
microsphere mean renal flow.

We conclude that PET with Rb-82 is a promising
technique for serial assessment of perfusion in the
heart and kidneys.

339
NONINVASIVE QUANTIFICATION OF REGIONAL
MYOCARDIAL BLOOD FLOW AND AMMONIA EXTRACTION
FRACTION USING TIME-ACTIVITY CURVES OF
MYOCARDIUM AND CARDIAC CAVITY AFTER N-13
AMMONIA INJECTION. M.Endo, T.A.Timura, T.Yamasaki, Y.Tateno, K.Yoshida, T.Himi,
A.Kagaya, Y.Masuda and Y.Inagaki.
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and Chiba University School of Medicine, Chiba

Noninvasive quantification of regional
cardiac blood flow (RMBF) is necessary to
facilitate detection and evaluation of
cardiac pathophysiology. Ammonia extraction
fraction (EF), which reflects ammonia meta-
bolism in myocardium, may provide another
important physiologic and diagnostic indi-
cator of the cellular viability in myocardium.
However noninvasive separation of the two
indicators was difficult until now. We tried to
measure the two quantities from time-
activity curves of myocardium and cardiac
cavity, which were obtained with N-13
ammonia and dynamic PET. Our method is as
follows. In a linear transfer system where
an input function is the curve of cardiac
cavity and an output function that of
myocardial curve, the system transfer function is
axe(-ct)+b and RMBF=a+b, EF=a/(a+b).
The parameters a, b and c can be calculated by
deconvolution. Two patients with hyper-
trophic cardiomyopathy were employed to
avoid partial volume effects and cross con-
taminations of activity. The results were
RMBF=67ml/min/100g, EF=80% for RMBF=65-
ml/min/100g, EF=81% for each patient.

340
EXERCISE 13N-NH3, POSITRON CT IN PATIENTS
WITH ISCHEMIC HEART DISEASE. H.Kambara,
T.Fudo, T.Hashimoto, C.Kawai, Y.Yonekura,
M.Senda, K.Torizuka, Kyotto University and
Fukui University, Kyoto and Fukui.

Early distribution of 13N-NH3, is consid-
ered to reflect a distribution of blood flow and positron CT (PCT) is said to be
superior to thallium scintigraphy in quantita-
tive analysis. This study was undertaken to evaluate the usefulness of exercise 13N-NH3,
PCT in assessment of myocardial ischemic
in evaluation of increments of 13N-NH3,
uptake by exercise.
PCT in normal subjects demonstrated a
homogeneous uptake of 13N-NH3 in the myo-
cardium and frequently visualized in the
capillary muscles and right ventricular
free wall. In patients with ischemic heart
disease perfusion defects were well visu-
alized in the area corresponding to the
involved coronary vessels and appears to be
determined more accurately than 201Tl single
photon emission CT (SPECT).

Relative myocardial uptake of 13N-NH3,
corrected by administration dose did not
show any significant difference between at
rest and on exercise in normal subjects,
but reduced in patients with ischemic heart
disease. Nitrates reduced the ischemic area
and improved the relative myocardial uptake.
In conclusion, 13N-NH3 PCT is valuable
in evaluation of ischemic heart disease.

341
RELATION BETWEEN GLUCOSE CONSUMPTION IN
ISCHEMIC MYOCARDIUM AND SERUM FREE FATTY
ACIDS CONCENTRATION. F.Shishido, K.Uemura,
A.Inugami, S.Higano, N.Tomura, H.Fujita,
H.Iida, H.Sasaki, I.Kanno, M.Murakami,
A.Takahashi and Y.Ono. Research Institute
for Brain and Blood Vessels-Akita, Akita.

Glucose is a secondary but an important
energy substrate for myocardium, and glu-
cose consumption in normal myocardium has
the large variations from the concentration
of serum free fatty acids (FFA). We
investigated the effect of FFA on myocardial
glucose consumption (MGC) using F-18
and Headtome-III, and also studied the
relation between MGC and myocardial blood
flow (MBF) determined by O-15 water auto-
radiographic method in 24 cases with
ischemic heart disease and in 3 normal
volunteers.

MGC(y) was inversely correlated with
FFA(x) in the normal myocardium (y=6.26-
4.30x, r=0.66; P<0.001), but MGC had no
relation with FFA in ischemic myocar-
dium. In 14/24 patients with abnormal
hypoperfusion, MGC was increased compared
with MBF. The areas of increased MGC were
larger than those of decreased MBF.

These findings suggest that high level of FFA is suitable to detect the lesions
of ischemic but viable myocardium with
F-18 FDG and PET, and that GMC is an
important role on detection of myocardial
ischemic lesions.

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